Reprinted from Science of the Total Environment, Volume 156, Lorber, M.; Cleverly, D.; Schaum, J.; Phillips, L.; Schweer, G.; Leighton, T. Development and validation of an air-to-beef food chain model for dioxin-like compounds, 39-65, 1994, with permission from Elsevier Science.

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# DEVELOPMENT AND VALIDATION OF AN AIR-TO-BEEF FOOD CHAIN MODEL FOR DIOXIN-LIKE COMPOUNDS

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## ABSTRACT

A model for predicting concentrations of dioxin-like compounds in beef is developed and tested. The key premise of the model is that concentrations of these compounds in air are the source term, or starting point, for estimating beef concentrations. Vapor-phase concentrations transfer to vegetations cattle consume, and particle-bound concentrations deposit onto soils and these vegetations as well. Congener-specific bioconcentration parameters, coupled with assumptions on cattle diet, transforms soil and vegetative concentrations into beef fat concentrations. The premise of the validation exercise is that a profile of typical air concentrations of dioxin-like compounds in a United States rural environment is an appropriate observed independent data set, and that a representative profile of United States beef concentrations of dioxin-like compounds is an appropriate observed dependent result. These data were developed for the validation exercise. An observed concentration of dioxin toxic equivalents in whole beef of 0.48 ng/kg is compared with a predicted 0.36 ng/kg. Principal uncertainties in the approach are identified and discussed. A major finding of this exercise was that vapor phase transfers of dioxin-like compounds to vegetations that cattle consume dominate the estimation of final beef concentrations: over 80% of the modeled beef concentration was attributed to such transfers.